

illuminating a second surface of the silicon substrate with a first illumination intensity of at least $10\text{mW}/\text{cm}^2$, controlling an etching current with the illumination of the second surface to form pores or trenches in the first surface of the silicon substrate extending toward the second surface of the silicon substrate; and

thereafter illuminating the second surface of the silicon substrate with a second illumination intensity, higher than the first illumination intensity, to extend the pores or trenches laterally to connect the pores or trenches to each other.

18. (Amended) A product manufactured by the electrochemical etching method in accordance with claim 14.

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ABSTRACT

An electrochemical etching system has an etching bath for holding an n-type silicon substrate with a first surface of the substrate in contact with hydrofluoric acid, an electrode positioned in the hydrofluoric acid, a power source having a positive pole connected to the silicon substrate and a negative pole connected to the electrode, and an illumination unit having a light source for illumination of a second surface of the silicon substrate. The illumination unit illuminates the second surface of the silicon substrate with an illumination intensity of $10\text{mW}/\text{cm}^2$ or more. A ratio of a maximum illumination to a minimum illumination of the second surface of the silicon substrate is 1.69:1 or less. With the etching system, pores and/or trenches of a certain size and shape can be formed in an entire area of the silicon substrate having a diameter of more than three inches.